

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

0459-0569P

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/787945

INTERNATIONAL APPLICATION NO.

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

PCT/DK99/00485

September 15, 1999

September 24, 1998

TITLE OF INVENTION

A HEARING AID ADAPTED FOR DISCRETE OPERATION

APPLICANT(S) FOR DO/EO/US

JORGENSEN, Martin B.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau). WO 00/18187
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☐ is transmitted herewith.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98-International Search Report (PCT/ISA/210) w/ 4 documents
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
 - 1.) PCT Substitute Claims Letter w/ International Preliminary Examination Report and Claims
 - 2.) Three (3) sheets of Formal Drawings

U.S. APPLICATION NO (if known, see 37 CFR 1.5)

09/787945

INTERNATIONAL APPLICATION NO

PCT/DK99/00485

ATTORNEY'S DOCKET NUMBER

0459-0569P

21. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5):**

Neither international preliminary examination fee (37 CFR 1.482)
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO
and International Search Report not prepared by the EPO or JPO. \$1,000.00

International preliminary examination fee (37 CFR 1.482) not paid to
USPTO but International Search Report prepared by the EPO or JPO \$860.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. \$710.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO
but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO
and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☒ 30
months from the earliest claimed priority date (37 CFR 1.492(e)).

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total Claims	18 - 20 =	0	X \$18.00
Independent Claims	2 - 3 =	0	X \$80.00

MULTIPLE DEPENDENT CLAIM(S) (if applicable)	RATE
None	+ \$270.00

TOTAL OF ABOVE CALCULATIONS =

☒ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are
reduced by 1/2.

SUBTOTAL =

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(f)).

TOTAL NATIONAL FEE =

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +

TOTAL FEES ENCLOSED =

Amount to be: refunded	\$
charged	\$

- a. ☒ A check in the amount of \$ 495.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account. No. _____ in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:

Birch, Stewart, Kolasch & Birch, LLP or Customer No. 2292

P.O. Box 747

Falls Church, VA 22040-0747

(703)205-8000

Date: March 23, 2001

By

John A. Castellano, #35,094

/cgc

09/787945

PATENT

0459-0569P

JC03/Rec'd PCT/PTO 23 MAR 2001

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: JORGENSEN, Martin B. Conf.:
Int'l. Appl. No.: PCT/DK99/00485
Appl. No.: New Group:
Filed: March 23, 2001 Examiner:
For: A HEARING AID ADAPTED FOR DISCRETE OPERATION

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION

Assistant Commissioner for Patents
Washington, DC 20231

March 23, 2001

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/DK99/00485 which has an International filing date of September 15, 1999, which designated the United States of America.--

IN THE CLAIMS:

Please amend the claims as follows:

8. (Amended) A hearing aid according to claim 4, wherein the controlling means comprises switching means adapted to control the operation mode of the hearing aid, the switching means being responsive to the deflection of the stiff lever.

11. (Amended) A hearing aid according to claim 4, wherein the stiffness of the lever is large enough to convey at least a pressure force of 5.0 Newton to the switch element.

13. (Amended) A hearing aid according to claim 9, wherein said switching means are adapted to switch an electrical signal between two predetermined levels, the controlling means being adapted to control the operation mode in response to a change in the electrical signal level provided by the switching means.

14. (Amended) A hearing aid according to claim 1, wherein the controlling means are adapted to control a power on/off operation mode of the hearing aid.

15. (Amended) A hearing aid according to claim 1, wherein the controlling means are adapted to select a particular pre-set listening program between a number of pre-set listening programs in the hearing aid.

16. (Amended) A hearing aid according to claim 1, wherein the controlling means are adapted to control a telecoil/microphone operation mode of the hearing aid.

17. A hearing aid according to claim 1, wherein the controlling means further comprises an integrated circuit.

18. (Amended) A hearing aid adapted to be positioned within an ear canal of an ear of a user, the hearing aid comprising means for manually removing the hearing aid from the canal, the removing means being fastened to the hearing aid and extending from the hearing aid toward an auricle of the ear, characterized in that the removing means comprise a stiff member adapted to remain in essentially the same predetermined position at least during normal deflection of said stiff member.

109290-576260

REMARKS

The specification has been amended to provide a cross-reference to the previously filed International Application. The claims have also been amended to delete multiple dependencies and to place the application into better form for examination. Entry of the present amendment and favorable action on the above-identified application are earnestly solicited.

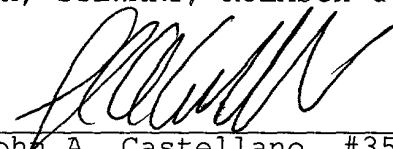
Attached hereto is a marked-up copy of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By


John A. Castellano, #35,094

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

JAc/cqc
0459-0569P

Attachment: Version With Markings Showing Changes Made

(Rev. 01/22/01)

VERSION WITH MARKINGS SHOWING CHANGES MADE

The specification has been amended to provide cross-referencing to the International Application.

The claims have been amended as follows:

8. (Amended) A hearing aid according to [any of claims 4-7]claim 4, wherein the controlling means comprises switching means adapted to control the operation mode of the hearing aid, the switching means being responsive to the deflection of the stiff lever.

11. (Amended) A hearing aid according to [any of claims 4-10]claim 4, wherein the stiffness of the lever is large enough to convey at least a pressure force of 5.0 Newton to the switch element.

13. (Amended) A hearing aid according to claim[s] 9[-12], wherein said switching means are adapted to switch an electrical signal between two predetermined levels, the controlling means being adapted to control the operation mode in response to a change in the electrical signal level provided by the switching means.

14. (Amended) A hearing aid according to [any of claims 1-13]claim 1, wherein the controlling means are adapted to control a power on/off operation mode of the hearing aid.

15. (Amended) A hearing aid according to [any of claims 1-13]claim 1, wherein the controlling means are adapted to select a particular pre-set listening program between a number of pre-set listening programs in the hearing aid.

16. (Amended) A hearing aid according to [any of claims 1-13]claim 1, wherein the controlling means are adapted to control a telecoil/microphone operation mode of the hearing aid.

17. A hearing aid according to [any of the preceding claims]claim 1, wherein the controlling means further comprises an integrated circuit.

18. (Amended) A hearing aid adapted to be positioned within an ear canal of an ear of a user, the hearing aid comprising means for manually removing the hearing aid from the canal, the removing means being fastened to the hearing aid and extending from the hearing aid toward an auricle of the ear, characterized in that the removing means comprise a stiff member adapted to remain in essentially the same predetermined position at least during normal deflection of said stiff member[movements of the user].

A HEARING AID ADAPTED FOR DISCRETE OPERATION JC03/Rec'd PCT/PTO 23 MAR 2001

FIELD OF THE INVENTION

- 5 The present invention relates to a hearing aid, which may be operated discretely by applying a force to the ear or its surroundings. A number of different functions of the hearing aid, such as turning a battery supply on/off, adjusting a volume control, shifting between a microphone and a telecoil input signal, etc., may be chosen or selected in the present hearing aid – all without directly engaging the hearing aid or switches or
- 10 potentiometers thereof. Also, when the hearing aid is adapted for use within the ear canal, an easier removal thereof is provided.

BACKGROUND OF THE INVENTION

- 15 Hearing aid technology continuously strives toward developing smaller hearing aids or hearing instruments. This development is helped by a continuous reduction in size for all components commonly utilised in hearing aids.

The advent of in-the-canal (ITC) type of hearing aids and completely-in-the-canal (CIC) type of hearing aids has brought several benefits to hearing aid users. Many users or potential users find it cosmetically attractive to wear an aid that may be completely contained within the ear canal, since this renders the aid invisible, at least in a majority of everyday situations.

25 Further, hearing aids of the ITC and CIC types provide acoustical benefits compared to a behind-the-ear (BTE) type of instrument. One benefit is improved directional hearing due to a major part of the outer ear being left unblocked by the ITC and CIC hearing aids, thereby preserving the natural directional properties of the outer ear.

30 While the cosmetic and acoustic improvements related to the use of ITC and CIC hearing aids are well recognised, there remain a number of practical problems related to the daily use and operation of these types of aids.

A hearing aid is usually provided with one or several control means, such as push buttons, switches, etc., which may be located on a face part of the hearing aid housing.

35

The control means may be adapted to provide a number of functions, such as turning the aid on/off, controlling a gain, changing between a number of predetermined listening programs, changing between a microphone signal and a telecoil signal, etc.

- 5 A first practical problem is the difficult operation of controlling means mounted on the face of the housing of the hearing aid. This problem originates from e.g. the inaccessible position of the hearing aid deep inside the ear canal, which normally makes it difficult for a user to find and properly operate the controlling means. The very limited available area of the face part of the aid further adds to this problem, since any controlling means must
- 10 have very small physical dimensions to fit on the face of the housing. This problem is pronounced for elderly people, which constitute the majority of hearing aid users, since they often have reduced capability to perform the necessary tiny movements of the controlling means with their fingertips.
- 15 A second problem is that it may be very difficult for the user to remove an ITC and especially a CIC type aid from its clamped-in position in the ear canal.

A solution to the problem of removing the aid is disclosed in US 5,381,484 wherein a pull-out string with beads is attached to a face part of a housing of a CIC aid. The beads

- 20 provided on the string enables the user to get a firm grip on the string and apply the force necessary to release the aid.

This solution, however, creates a derived third problem, since, during the release process, an acoustic leakage path is inevitably created in the ear canal between the microphone

25 mounted on the face part and a sound emitting transducer (receiver) of the hearing aid.

This leakage path will usually make the hearing aid oscillate at a high frequency and at full output power, producing a sustained and highly irritating noise into the ear of the user until the battery supply is turned off, or the gain is turned down. Also, a string pointing out of the ear is not desirable for cosmetic reasons.

30

SUMMARY OF THE INVENTION

It is an object of the invention to solve these two above mentioned basic problems and the third derived problem.

35

In a first aspect, the invention provides a hearing aid comprising a housing and means for controlling an operation mode of the hearing aid, wherein said controlling means are adapted to be responsive to a force applied to a part of an auricle of the hearing aid user.

- 5 Thus, the hearing aid may be operated by applying a force to a part of the outer ear instead of manipulating small switches or control buttons mounted on the face part of the hearing aid, when the aid is positioned e.g. inside the ear canal. This operation method may replace all or at least some of the functions traditionally provided by control switches and push buttons on the face part of the hearing aid.

10

In this manner, a more discrete and convenient operation of the hearing aid is obtained.

Thus, the hearing aid user may operate the hearing aid by applying a pressure with his/hers finger to a predetermined part of the outer ear. As will be clear from the following,

- 15 different types of hearing aids may be adapted to use different parts of the ear.

In one embodiment, the hearing aid is of the BTE type, where the housing is adapted to be placed at a position behind the ear, and wherein the controlling means comprise sensing means positioned on at least one side of the hearing aid housing facing the head or facing the ear lobe of the user, the sensing means being adapted to sense a force applied to the user's auricle, and the controlling means being responsive to the sensing of the sensing means. In this embodiment, the predetermined part of the outer ear may be the tail of the helix. The sensing means may, in this situation, be mounted on a side of the BTE housing, in such a manner that the means senses the applied force.

20
25

In another embodiment, the housing is adapted to be placed within the ear canal, which is the case for hearing aids of the CIC or ITC type. In this situation, the predetermined part of the auricle that receives the applied force may be the tragus.

- 30 In this embodiment, the controlling means preferably comprise a stiff lever having two ends, a first end, which may be attached to a switching means or a face part of the housing. The lever, further, being adapted to be deflected by application of the force to the auricle, such as to a tragus, of the ear, and the controlling means being responsive to the deflection of the lever

35

Thus, the lever preferably possesses a suitable stiffness to transfer at least a part of the applied force to the controlling means. Preferably, a second end of this lever is placed within the ear canal at a position in close proximity to e.g. the inside part of the tragus of the user's ear.

5

Since the dimensions and colours of human ears vary widely, it may be advantageous to produce a number of levers in different lengths and colours. Further, due to these anatomic variations, it may be advantageous to provide the levers with a number of different mounting angles between the face plate of the hearing aid and the lever, the angle variation, preferably, being restricted to the range from 60-120 degrees.

In the situation wherein a number of different levers are provided, the hearing aid may be manufactured with a detachable connection between the hearing aid housing and the lever. The place at which the hearing aid is fitted to the user, often a dispensing office, may stock a number of levers of differing lengths, colours and mounting angles. The fitting procedure at the dispensing office may include the step of selecting the size and/or the shape and/or the mounting angle of the lever to properly position it in close proximity to e.g. the tragus of the user's ear. The lever may, thereby, be adequately deflected from its rest position, when a force is applied to the tragus, and a response may be generated in the controlling means.

Also, hearing aids of the CIC or ITC types may be shaped on the basis of the actual shape of the ear canal of the user. In this process of moulding the outer contours of the hearing aid, the shape of the lever may be determined or selected – or even custom made.

Also, the stiff lever may be used for a second purpose. The lever may further be adapted to assist the user in removing the hearing aid from the ear canal. Thus, preferably the lever further comprises engaging means adapted to facilitate engagement with the hearing aid during removal. Naturally, this removal may be performed by the user using his/her fingers or by using a tool. Especially when a tool is used, it is preferred that the engaging means comprise a loop-shaped or hook-shaped part.

A major advantage of using the present lever is the fact that it is at least relatively stiff, which means that the engaging means will remain in at least substantially the same,

predetermined position during normal use and movements by the user. In this manner, the position thereof is well known and removal of the hearing aid easier. Also, when using an extraction tool, the engaging means may be positioned farther (and, thus, more invisible) into the ear canal than if they were to be engaged by a finger of the user.

5

The engaging means are preferably shaped so that the lever is provided with a loop-shaped outline and being suitable for mass production through the use of an injection mould. The loop-shaped outline is advantageous since it provides a firm grip for the fingers of the hearing aid user, thereby helping him/her to release the hearing aid from the ear canal without the use of extraction tools.

The exact manner in which the deflection of the lever is detected and used by the controlling means to control the manner of operation may differ widely. However, preferably the controlling means comprises a switching means, such as an on/off switch, a momentary switch, etc. adapted to control the operation mode of the hearing aid, the switching means being responsive to the deflection of the stiff lever.

In the situation where the controlling means are provided with a momentary switch, the switch element is, preferably, responsive to an applied force of between 0,5 - 5,0 Newton, even more preferably around 0,8 Newton. The term "being responsive to" means that the switch element will change from one state to another state.

Thus, the lever is, preferably, provided with a stiffness sufficiently large to convey a pressure force of at least 0,8 Newton, or more preferably at least 5,0 Newton to the switch element. A suitably constructed lever will convey the pressure force to the switch element, if the force is applied along the length axis of the lever or if the force is applied perpendicularly to the length axis of the lever.

The stiffness of the lever will, of course, depend on its shape and its dimensions, such as its length, as well as the type of material used for it.

The stiffness of the lever may be tested by selecting a 5 mm long lever and at the first end provide a fixed restraining of the lever, and subsequently applying a force of 0,8 N at the second end of the lever where the force is applied substantially perpendicularly to the length axis. Subsequently, the deflection of the second end, resulting from of the applied

pressure, is measured. A 5 mm long lever suitable for application in the present invention has, preferably, a deflection within the interval 0-5 mm, more preferably within the interval 0-2 mm, even more preferably within the interval 0-1 mm.

- 5 The deflection of the lever is measured in its least stiff direction, if the lever is unsymmetrical about the length axis.

The lever is, preferably, provided with a length, l_g , within the interval 4-10 mm. The stiffness of the lever of any of these lengths may be tested as described above, and the

- 10 deflection is, preferably, within the interval $0-1.0 \cdot l_g$ mm, more preferably within the interval $0-0.4 \cdot l_g$ mm, even more preferably within the interval $0-0.2 \cdot l_g$ mm.

The lever is, preferably provided in metal or a thermo-plastic material, but a lever of adequate stiffness as defined above, may be provided in a large variety of materials,

- 15 dimensions and shapes.

Thus, the switching means may be mechanically connected to the stiff lever, and a force applied to e.g. the tragus of the user's ear will cause the switching means to change its state. This change of state may be sensed by the controlling means, and as a response

- 20 the controlling means may change the operation mode of the hearing aid.

Measurements, performed by the inventor, on ears of a variety of individuals have revealed that a force applied to the tragus in the range of 30-50 grams, equivalent to 0,3-0,5 Newton, will displace the tragus with approximately 0.5 - 1.0 cm from its rest position

- 25 on an average individual.

In response to this deflection of the tragus, the lever may be deflected and thereby convey a sufficient part of the applied force to the switching means to change its state.

- 30 The momentary switch may be one, which provides two different states. The states may be provided as a first state wherein two legs of the switch are shorted and a second state wherein the two legs are open i.e. having a substantially infinite resistance between them.

- The two states of the switch may further be provided as a corresponding electrical signal
35 representing these states, such as zero (ground) signal and V_{bat} (positive power supply)

signal, and this electrical signal may be sensed by the controlling means, thereby providing a hearing aid wherein the switching means are adapted to alternate an electrical signal level between two predetermined levels, the controlling means being adapted to control the operation mode in response to a change in the electrical signal level provided
5 by the switching means.

The controlling means may comprise an integrated circuit, such as a CMOS circuit, a Bipolar circuit, a BiCMOS circuit, etc. The integrated circuit may, further, comprise logic means adapted to control the operation of the hearing aid.

10

In one embodiment, the electrical signal provided by the switching means is adapted to control the battery supply on/off operation mode of the hearing aid. This embodiment is particularly well suited for CIC hearing aids, since these aids, by their nature, are located deep inside the ear canal where it is difficult for the user to locate and operate traditional
15 switches or push buttons. The present invention provides a better solution for the hearing aid user to this tedious switching operation, since the invention may provide a CIC hearing aid wherein the battery supply on/off is controlled by depressing the tragus of the ear.

In another embodiment, the controlling means may be adapted to control a
20 microphone/telecoil input signal selection from the change in the electrical signal level provided by the switching means.

In yet another embodiment, the controlling means are adapted to select a particular pre-set listening program between a number of pre-set listening programs comprised in the
25 hearing aid. An EEPROM in the hearing aid may comprise several different listening programs that have been selected and subsequently loaded into the EEPROM at a dispensing office.

In the situation where the switching means comprises a momentary switch and the
30 controlling means further comprises an integrated circuit, the operation mode change of the hearing aid may be activated only after the tragus has been depressed during a predetermined time interval. This predetermined time interval may be controlled by the integrated circuit. By choosing a suitable time interval, accidental activation of the operation mode control may be prevented or minimised by "normally" occurring touches
35 and scratches of the tragus. In a second aspect of the invention, the controlling means

comprise a rigid lever with an engaging means that provides the hearing aid user with a firm grip, so that he/she may release the hearing aid from the ear canal. In this aspect, the invention relates to a hearing aid adapted to be positioned within an ear canal of an ear of a user, the hearing aid comprising means for manually removing the hearing aid from the ear canal, the removing means being fastened to the hearing aid and extending from the hearing aid toward an auricle of the ear, and wherein the removing means comprise a stiff member adapted to remain in essentially the same predetermined position at least during normal movements of the user.

10 BRIEF DESCRIPTION OF THE DRAWINGS

In the following, a preferred embodiment of a controlling means according to the invention will be described for use in a CIC type of hearing aid, and in relation to the drawing wherein

Fig. 1 shows a perspective view of a controlling means comprising a loop shaped stiff lever,

Fig. 2 shows a side view of the controlling means,

Fig. 3 is an illustration of a CIC hearing aid comprising a loop-shaped stiff lever and mounted in an ear canal.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Fig. 1 shows a perspective view of a controlling means 20, which is adapted for use in a CIC type of hearing aid. The controlling means comprises stiff lever 1 with a loop shaped outline 5, a switch unit 10 of the momentary type. The stiff lever is, preferably, manufactured in a metal or a thermo-plastic material, the latter may comprise reinforcement. Both types of materials may provide a lever of suitable stiffness in the preferred shape or shapes. The loop-shaped lever constitutes an engaging means, and a part of the lever may be provided with a ribbed pattern, thereby providing the hearing aid user with an item that may be firmly gripped with the fingers and used to pull out the aid from the ear canal.

The switch unit 10 comprises two gold-coated electrical contacts as seen on Fig. 2 items 30 and 31. This unit 10 may be attached to a face part of a hearing aid housing (not shown). The contacts 30 and 31 may be connected by means of electrical conductors to a control circuit (not shown) that may be comprised on a hearing aid printed circuit board 5 (not shown). The control circuit may sense the electrical signal on a single or both contacts to determine the state of the switch i.e. whether the switch is in its rest position or in its active position.

Preferably, one of the switch contacts 30 and 31 provides one of two different DC 10 voltages 0 volt and battery supply voltage (VBAT) to the control circuit depending upon the state of the switch.

Fig. 2 shows a side view of the controlling means 20 with the stiff lever 1 in a rest position. The arrow 25 indicates the direction to which the stiff lever 1 is deflected when a force is 15 applied to it. The stiff lever 1 is attached to the switch unit 10 by pivot pin 3. A circular flange 32 is further provided to securely fasten the controlling means 20 of fig. 1 to the face part of the hearing aid housing when a "pull-out force" is applied to the stiff lever 1.

When the deflection of the stiff lever 1, around the pivotal pin 3, is larger than 20 approximately 15 degrees, the electrical contact provided between contacts 30 and 31 in the rest position with zero deflection, is disconnected. This disconnection is sustained until the applied force acting upon the lever 1 is removed. When the applied force is removed, a spring (not shown) surrounding the pivotal pin 3 provides a force, which is adapted to move the stiff lever 1 back to its rest position, and thus the contacts 30 and 31 again into 25 electrical contact.

Fig. 3 shows a CIC type of hearing aid 35 mounted in an ear canal 40 of a hearing aid user. The aid comprises controlling means with a loop-shaped stiff lever 1, which is mounted in close proximity to a tragus 36 on an auricle 41 of the hearing aid user.

CONFIRMATION COPY

1

CLAIMS

1. A hearing aid comprising, a housing and means for controlling an operation mode of the hearing aid, characterised in that said controlling means are adapted to be responsive
5 to a force applied to a part of an auricle of an ear of a hearing aid user.

2. A hearing aid according to claim 1, wherein the housing is adapted to be placed at a position behind the ear, and wherein the controlling means comprise sensing means positioned on at least one side of the housing facing the head or facing the ear lobe of the
10 user, the sensing means being adapted to sense a force applied to the user's auricle, and the controlling means being responsive to the sensing of the sensing means.

3. A hearing aid according to claim 1, wherein the housing is adapted to be placed within an ear canal of the ear.

15 4. A hearing aid according to claim 3, wherein the controlling means comprise a stiff lever having two ends, one of which is attached to a face part of the housing, the lever being adapted to be deflected by application of the force to the auricle, such as to a tragus, of the ear, and the controlling means being responsive to the deflection of the lever.

20 5. A hearing aid according to claim 4, wherein the lever is adapted to also be used by the user to remove the hearing aid from the ear canal.

6. A hearing aid according to claim 5, wherein the lever further comprises engaging
25 means adapted to facilitate engagement with the hearing aid during removal.

7. A hearing aid according to claim 6, wherein the engaging means comprises a loop-shaped or hook-shaped part.

30 8. A hearing aid according to any of claims 4-7, wherein the controlling means comprises switching means adapted to control the operation mode of the hearing aid, the switching means being responsive to the deflection of the stiff lever.

9. A hearing aid according to claim 8, wherein the switching means comprises a
35 momentary switch.

10. A hearing aid according to claim 8, wherein the switching means comprises an on/off switch.

5 11. A hearing aid according to any of claims 4-10, wherein the stiffness of the lever is large enough to convey at least a pressure force of 5,0 Newton to the switch element.

12. A hearing aid according to claim 11, wherein the pressure force is applied perpendicular to the length axis of the lever.

10

13. A hearing aid according to claims 9-12, wherein said switching means are adapted to switch an electrical signal between two predetermined levels, the controlling means being adapted to control the operation mode in response to a change in the electrical signal level provided by the switching means.

15

14. A hearing aid according to any of claims 1-13, wherein the controlling means are adapted to control a power on/off operation mode of the hearing aid.

15. A hearing aid according to any of claims 1-13, wherein the controlling means are adapted to select a particular pre-set listening program between a number of pre-set listening programs in the hearing aid.

20

16. A hearing aid according to any of claims 1-13, wherein the controlling means are adapted to control a telecoil/microphone operation mode of the hearing aid.

25

17. A hearing aid according to any of the preceding claims, wherein the controlling means further comprises an integrated circuit.

18. A hearing aid adapted to be positioned within an ear canal of an ear of a user, the hearing aid comprising means for manually removing the hearing aid from the canal, the removing means being fastened to the hearing aid and extending from the hearing aid toward an auricle of the ear, characterised in that the removing means comprise a stiff member adapted to remain in essentially the same predetermined position at least during normal deflection of said stiff member. ~~movements of the user.~~

35

1/3

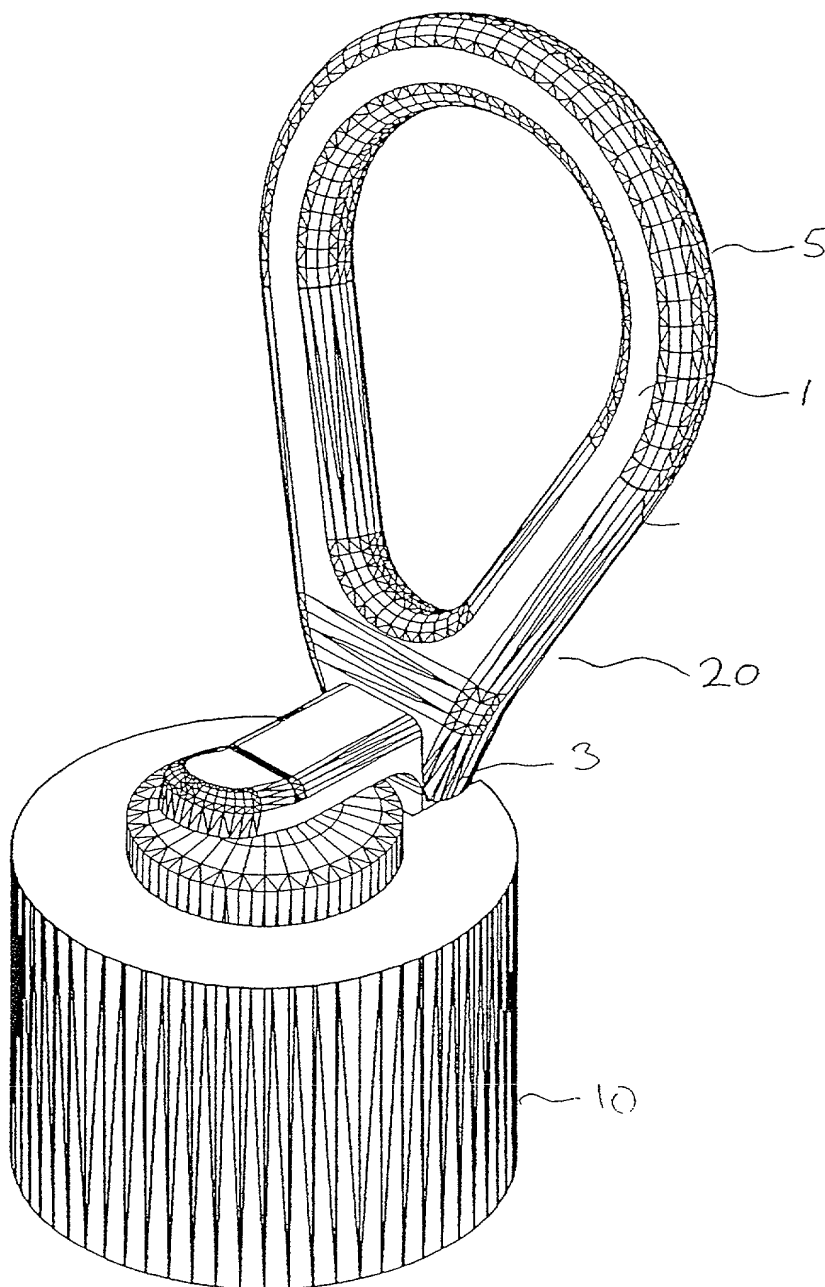


Fig. 1

2/3

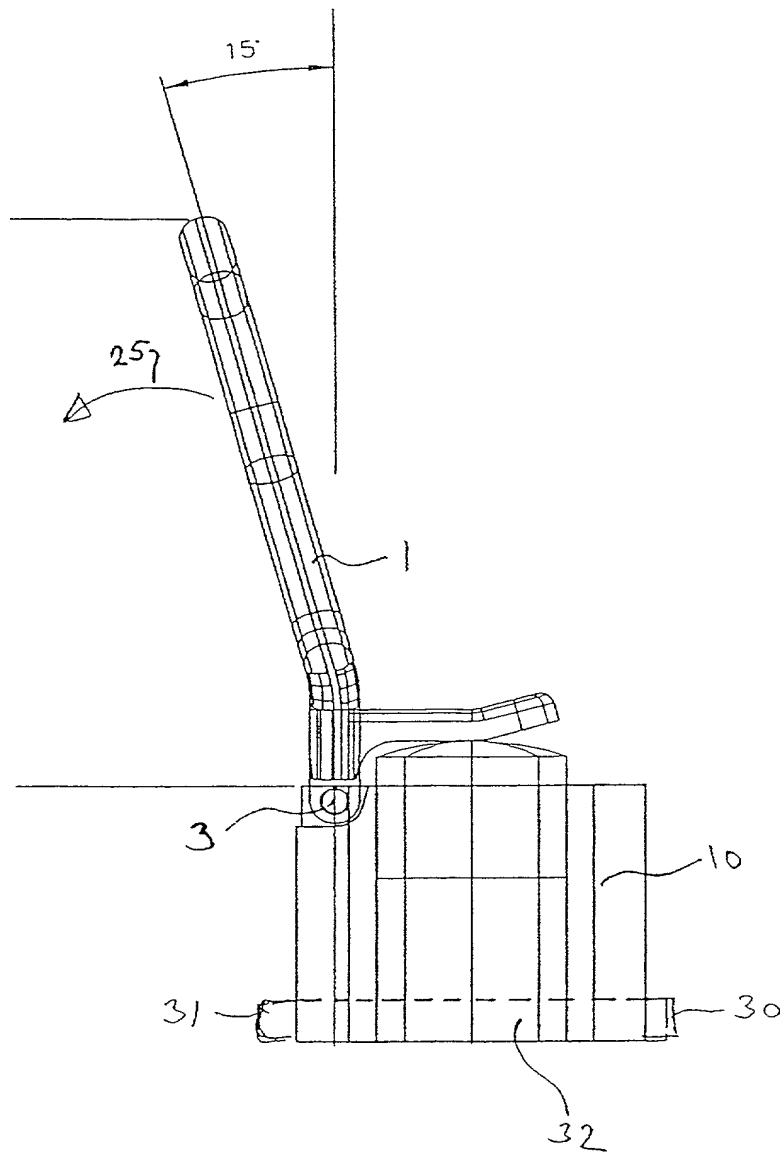


Fig. 2

3/3

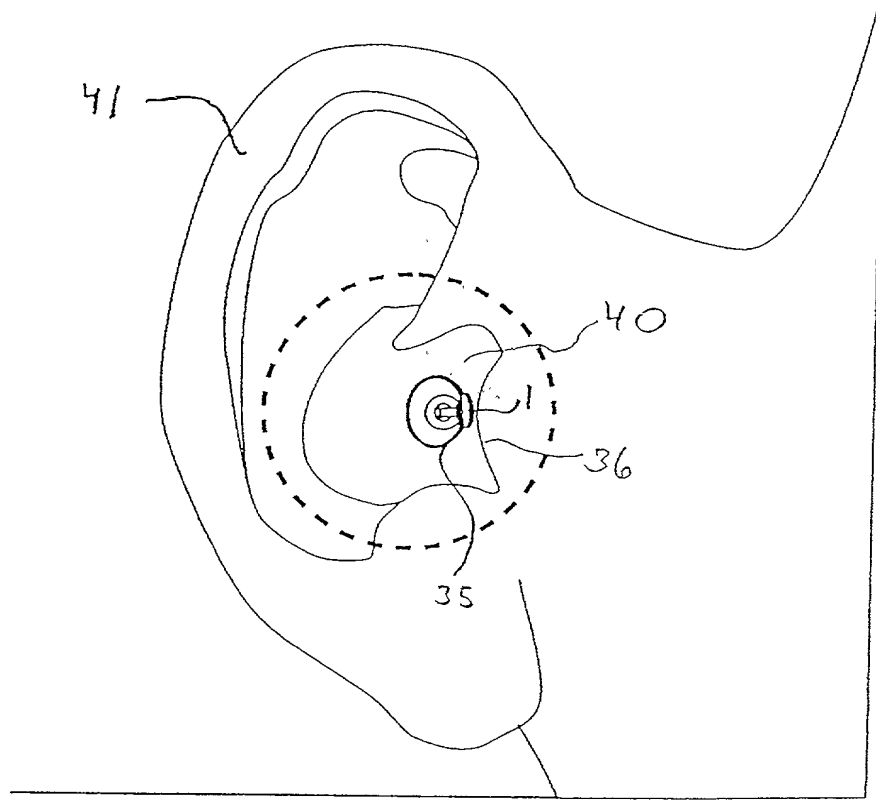


Fig. 3

BIRCH, STEWART, KOLASCH & BIRCH, LLP

P.O. Box 747 • Falls Church, Virginia 22040-0747
 Telephone: (703) 205-8000 • Facsimile: (703) 205-8050

PLEASE NOTE:
 YOU MUST
 COMPLETE THE
 FOLLOWING

COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT AND DESIGN APPLICATIONS

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title:

A HEARING AID ADAPTED FOR DISCRETE OPERATION

Fill in Appropriate
 Information -
 For Use Without
 Specification
 Attached:

the specification of which is attached hereto. If not attached hereto,
 the specification was filed on March 23, 2001 as
 United States Application Number 09/787,945;
 and amended on March 23, 2001 (if applicable) and/or
 the specification was filed on September 15, 1999 as PCT
 International Application Number PCT/DK99/00485; and was
 amended under PCT Article 34 on December 11, 2000 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56. I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)**Priority Claimed**

Insert Priority
 Information:
 (if appropriate)

<u>PA 1998 01206</u> (Number)	<u>Denmark</u> (Country)	<u>September 24, 1998</u> (Month/Day/Year Filed)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<u> </u> (Number)	<u> </u> (Country)	<u> </u> (Month/Day/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<u> </u> (Number)	<u> </u> (Country)	<u> </u> (Month/Day/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<u> </u> (Number)	<u> </u> (Country)	<u> </u> (Month/Day/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional applications(s) listed below.

Insert Provisional
 Application(s):
 (if any)

<u> </u> (Application Number)	<u> </u> (Filing Date)
<u> </u> (Application Number)	<u> </u> (Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More than 12 Months (6 Months for Designs) Prior to the Filing Date of This Application:

Country	Application Number	Date of Filing (Month/Day/Year)
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

Insert Requested
 Information:
 (if appropriate)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States and/or PCT application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States and/or PCT application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Insert Prior U.S.
 Application(s):
 (if any)

<u> </u> (Application Number)	<u> </u> (Filing Date)	<u> </u> (Status - patented, pending, abandoned)
<u> </u> (Application Number)	<u> </u> (Filing Date)	<u> </u> (Status - patented, pending, abandoned)

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

Raymond C. Stewart	(Reg. No. 21,066)	Terrell C. Birch	(Reg. No. 19,382)
Joseph A. Kolasch	(Reg. No. 22,463)	James M. Slattery	(Reg. No. 28,380)
Bernard L. Sweeney	(Reg. No. 24,448)	Michael K. Mutter	(Reg. No. 29,680)
Charles Gorenstein	(Reg. No. 29,271)	Gerald M. Murphy, Jr.	(Reg. No. 28,977)
Leonard R. Svensson	(Reg. No. 30,330)	Terry L. Clark	(Reg. No. 32,644)
Andrew D. Meikle	(Reg. No. 32,868)	Marc S. Weiner	(Reg. No. 32,181)
Joe McKinney Muncy	(Reg. No. 32,334)	Donald J. Daley	(Reg. No. 34,313)
John W. Bailey	(Reg. No. 32,881)	John A. Castellano	(Reg. No. 35,094)
Gary D. Yacura	(Reg. No. 35,416)		

Send Correspondence to:

BIRCH, STEWART, KOLASCH & BIRCH, LLP
P.O. Box 747 • Falls Church, Virginia 22040-0747
Telephone: (703) 205-8000 • Facsimile: (703) 205-8050

or

Customer No. 2292

**PLEASE NOTE:
YOU MUST
COMPLETE
THE
FOLLOWING:**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First
of Sole Inventor:
Insert Name of
Inventor
Insert Date This
Document is Signed

Insert Residence
Insert Citizenship

Insert Post Office
Address

Full Name of Second
Inventor, if any:
see above

Full Name of Third
Inventor, if any:
see above

Full Name of Fourth
Inventor, if any:
see above

GIVEN NAME/FAMILY NAME		INVENTOR'S SIGNATURE	DATE*
Martin Bondo JORGENSEN		<i>[Signature]</i>	21 JUN 01
Residence (City, State & Country)		CITIZENSHIP	
Smorum DENMARK <i>DKX</i>		Danish	
MAILING ADDRESS (Complete Street Address including City, State & Country)			
Lupinhaven 36, DK-2765 Smorum DENMARK			
GIVEN NAME/FAMILY NAME		INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
MAILING ADDRESS (Complete Street Address including City, State & Country)			
GIVEN NAME/FAMILY NAME		INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
MAILING ADDRESS (Complete Street Address including City, State & Country)			
GIVEN NAME/FAMILY NAME		INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
MAILING ADDRESS (Complete Street Address including City, State & Country)			

*DATE OF SIGNATURE